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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/854,813	05/14/2001	Eric H. Johnson	17732-3675000	8846

7590

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EXAMINER

SAGAR, KRIPA

ART UNIT

PAPER NUMBER

1756

DATE MAILED: 02/27/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n No.

09/854,813

Applicant(s)

JOHNSON ET AL.

Examiner

Kripa Sagar

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 May 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-9 and 18-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites "determining one or more acceptable layout dimensions". The specification discusses the factors affecting the layout dimensions (p.7,l.29 – p.8,l-9). However the method or steps by which the 'acceptable" layout dimension is determined is vague and indefinite.

Claims 3,4,5 recite "*the* structure" in the claims . The claims depend from claim 1 which recites "structures having one or more severe non-flat topologies". It is not clear which structure is referred to. There is no antecedent basis for this limitation.

Claim 9 recites applying a photoresist "after said filling in step". There is no antecedent basis for this limitation. There is no explicit mention of a "filling in step" in claim 1 from which claim 9 depends.

Claim 18 recites "the device comprising:" . There is no antecedent basis for this limitation. There is no reference to a device in the claim.

Claim 24 recites a "medical sensor". This term is vague and undefined. A clinical thermometer being a medical sensor would not fit the descriptions of claim 18.

Claims 2,6-8 depend from claim 1. Claims 19-23 depend from claim 18.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by the non-patent publication of Olsen.

The claim recites a method of controlling feature dimensions on non-flat surfaces in a photolithographic process. The method comprises adjusting the layout dimensions of features based on the exposure apparatus, conformal layers and the photoresist thickness. The features are formed on the substrate with the adjusted layout dimensions and the surface is planarized.

5. Olsen teaches the elementary principles behind planarization. The planarization process takes in to account the focus latitude of the photolithographic system.(p.353, and p.357). It teaches planarization factors such as gap-filling with conformal coating and global planarization with a coating layer. The layout dimensions are considered (p.358 and Fig.11, p.357). Diverse planarization techniques are discussed (p.359-448).

6. Claims 1-17 are rejected under 35 U.S.C. 102(b) as being anticipated by US Pat. 5674773 to Koh et al.

The claims recite a method of controlling feature dimensions on non-flat surfaces in a photolithographic process. The method comprises adjusting the layout dimensions of features based on the exposure apparatus, conformal layers and the photoresist thickness. The features are formed on the substrate with the adjusted layout dimensions and the surface is planarized. The planarization is effected through one or multiple conformal layers and / or a planarizing layer. Polysilicon and insulative layers are blanket deposited.

Koh teaches planarization of structures with large step-heights. The equipment DOF (depth-of-focus) is considered. The layout is changed to facilitate planarization (Fig.2). This is rudimentary prior-art (1;46-2;15). In Koh's invention (Fig.3-7) a global planarization pattern (46) is formed (layout change) on a semiconductor substrate with a high step-height integrated circuit structure. The initial structure (Fig.3) is formed by etching the semiconductor (6;42-54). A planarizing dielectric layer (50) is deposited on the structure. The dielectric layer is reflowed to planarize the structure (3;1-13). A blanket photoresist is coated to a thickness such that it is within the DOF of the lithographic tool (3; 33-37). Several conformal layers (36,40,44) are coated over the structures. The conformal layers may include a layer (36) of insulator that is blanket deposited (6;33-41). One of the conformal layers may be a polysilicon (42) layer (7;13-17). Thus Koh teaches all the elements of claims 1-17.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 18-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koh in view of US Pat. 5963788 to Barron et al. and further in view of US Pat. 6103399 to Smela et al.

These claims recite planarization for a photolithographic process for a MEMS (micro-electro-mechanical structure) device with severe non-flat topologies. The layout dimension of the structure of the device is adjusted to compensate for several factors that include the equipment, resist thickness, conformal coatings and fillers. Diverse devices are listed.

The teachings of Koh have been discussed above. It teaches laying out the feature dimensions based on the DOF of the tool, conformal depositions and a planarizing layer (filler) that evens out the topology.

Koh's invention is directed to a semiconductor device and does not explicitly refer to MEM structures. It does not teach different MEMS devices.

Barron teaches that MEMS structures have severe non-flat topologies (1;53-63) and such devices integrated with semiconductor circuits pose special challenges to

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fabrication (2;24-27). The process of forming an integrated device is shown in Figs.2-13. After the fabrication of MEMS devices in a cavity, the cavity is filled with a conformal oxide (32) layer(Fig.5, 7;33-37). The oxide layer is partially covered and etched back followed by a polishing step.(7;40-49). The planarized surface is amenable to fabrication of electronic circuitry using conventional steps, as shown by Koh. Barron teaches that this technique can be used to fabricate a variety of devices such as motors, accelerometers, pressure/flow/chemical sensors and the like (4; 35-49).

Barron does not specifically teach the fabrication of a pump or a biomedical sensor.

Such sensors are widely known in prior art as shown by Smela (1;30-53).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form diverse sensors using the teachings of Smela and Barron and suing the planarizing steps of Koh and Barron because Barron teaches that this facilitates the integration of the sensor(device) with the electronic circuitry and Smela teaches that these devices are widely known and successfully fabricated.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kripa Sagar whose telephone number is 703-605-4427. The examiner can normally be reached on M-F.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on 703-308-2464. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703.

MH/ks
February 21, 2003

A handwritten signature in black ink, appearing to read "Mark F. Huff", with a long, sweeping horizontal line extending to the right.

MARK F. HUFF
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700